# MODOC NATIONAL WILDLIFE REFUGE

ALTURAS, CALIFORNIA

ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1993

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

REVIEW AND APPROVAL

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ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1993

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| _____ | _____ | _____ | _____ |
| Refuge Manager | Date | Associate Manager CA/NV | Date |

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| _____ | _____ |
| Regional Office Approval | Date |

## INTRODUCTION

The 6283 acre Modoc National Wildlife Refuge (NWR) is located along the south fork of the Pit River in Modoc County, just south of the town of Alturas in extreme Northeast California. The refuge is bordered on the east side by the Warner Mountains. This impressive range rises to an average elevation of 8000 feet, and contains extensive stands of ponderosa pine and White fir trees. This mountain range is also the principal watershed for the entire valley west of it, including the refuge. The landscape surrounding the refuge includes rolling hills, canyons, and plateaus with a sagebrush/juniper vegetative community.

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Aerial photograph of headquarters area with Dorris Reservoir in the background. MDC-2980 3/28/92 RLR.

The refuge is located on the western edge of the Great Basin Desert, resulting in a rather severe climate. Cold, wet winters (temperatures of -40° F have been recorded) and cool, dry summers are the rule. Drought and flooding conditions are quite common and both have been known to occur during the same year.

The refuge consists of irrigated meadows, natural flood plains, marsh communities, and sagebrush/juniper uplands. Soil types are basically heavy clays having a high alkalinity. Black alkali surrounded by salt concentrations are not uncommon on the poorly drained areas of the refuge.


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## A. HIGHLIGHTS

- Drought conditions enter sixth straight year at Modoc NWR. (section B)

- E. Clark Bloom transfers to Salton Sea NWR after 19 years as Project Leader at Modoc NWR (section E-1)

- David Johnson assumes the Project Leader position at Modoc.

- Water rights hearing finally completed to consider petitions to authorize additional uses of water on the refuge (section F-11)

- Refuge hunt area reduced by 50 percent as a result of drought conditions.

- Dorris Reservoir Public Use Management Plan in 2nd draft is now put on hold until next year when compatibility determination is completed.

- Refuge well is activated to provide the only water source for the east half of the refuge.

- Modoc NWR 1st annual Junior Pheasant Hunt is implemented.

- Modoc NWR 1st annual Audubon Christmas Bird Count is conducted.

- Cons continue to carry out construction/maintenance projects for the refuge. (section I)

## B. CLIMATIC CONDITIONS

To fully appreciate the climatic conditions of 1993 it is necessary to first review the weather of the preceding year. A record setting drought dominated not only the climatic conditions but all aspects of the refuge in 1992. The refuge irrigation reservoir (Dorris Reservoir) dropped to well below the bottom of the outlet pipe for the first time in refuge history. This was the sixth year of drought in California and by far the most severe for the refuge and all surrounding country. On January 1,1993 nearly all ponds on the refuge were dry. Anything less than a really wet winter and spring would not provide enough run-off to refill the refuge wetlands and Dorris Reservoir.

Luckily the last two weeks of 1992 saw heavy snowfall, and this continued into 1993 for the rest of the winter. During January the refuge receive the most snowfall of any one month in over twenty years. This, followed by a wet spring, filled all the refuge wetlands as well as recharging Dorris Reservoir to the point of spilling, something that was considered highly unlikely only a few months before.

The total precipitation for 1993 was 16.61", more than 35% above normal. The total snowfall was also at least four inches above normal at 44.95" . The wettest month of 1993 was January with 2.45" liquid equivalent. It was also the month with the greatest snow fall, totaling 27.2", well over half the average snowfall for an entire year. There was measurable rain fall every month of the year. The driest month of 1993 was July with 0.12"

Temperatures during 1993 were cooler than normal for much of the year, especially during late spring and into mid summer. The average temperature for July was the lowest on record for Alturas. This created some problems for plant growth, but no one seemed to mind given the hot temperatures and extreme drought of the year before. Temperature extremes for the year occurred on January 4 (-8 degrees) and August 3 (97 degrees).

The year started with the Dorris Reservoir water level 15.48 feet below the spillway, about at the level of the bottom of the outlet pipe. Run-off steadily filled the reservoir until April 9, 1993 when there lake began to spill. The reservoir did not stop spilling until June 21. Under any condition it is unusual for Dorris Reservoir to spill for more than a few weeks at most, but given that the reservoir was nearly dry at the beginning of the storage season, it was truly amazing that water continued to spill for so long. The reservoir reached it's low point of the season on November 15, 1993 at only 7.44 feet below the spillway, just over nine feet higher than the low point of the previous year.

Table 1. Temperature and precipitation during 1993 at Modoc NWR.

| Month | TEMPERATURE Maximum (°F) | Minimum (°F) | PRECIPITATION Total (inches) | Snow depth (inches) |
|---|---|---|---|---|
| January | 48 | -8 | 2.45 | 27.2 |
| February | 53 | 0 | 0.97 | 6.15 |
| March | 70 | 11 | 1.45 | 2.00 |
| April | 69 | 20 | 1.37 | 1.10 |
| May | 83 | 25 | 2.34 | 0.25 |
| June | 90 | 27 | 1.92 | 0.0 |
| July | 90 | 28 | 0.12 | 0.0 |
| August | 97 | 33 | 1.06 | 0.0 |
| September | 93 | 20 | 0.16 | 0.0 |
| October | 87 | 23 | 2.31 | 0.0 |
| November | 65 | -5 | 1.52 | 4.55 |
| December | 57 | 1 | 0.94 | 3.70 |
| Totals | | | | 16.61 |

44.95

## C. LAND ACQUISITION

### 1. Fee Title

The acquisition of a 103 acre parcel of wetlands known as the Ed Clark (formally the Stephens Ranch) labored through the entire year. A shortage of inholding dollars delayed payment in 1991 as was originally planned. Fortunately for the FWS, Realty folks were able to stall Mr. Clark off with final payment being promised in January of 1992, almost one year later than the original date negotiated.

### 2. EASEMENTS

As a result of the Dorris Reservoir management plan, it became obvious that the FWS was in dire need of at least limited control of activities on private lands adjacent to the reservoir. Therefore, it was decided to seek an easement on the 70% of shoreline that is in private ownership. This easement will close the shoreline to any public use when Canada Geese are nesting (March 1 - May 31). The two land owners who have the majority of goose nesting habitat were receptive to the idea of an easement. Work began on this project in mid-summer and by the end of the year all preliminary work was completed. Appraisals were scheduled for the spring of 1992 finalizing the easements. However, this was not accomplished and the easements are still being enforced under a "gentlemen's agreement" between landowners and the Service.

### 4. Farmers Home Administration Conservation Easements

The refuge has been actively involved with two proposed conservation easements in Lassen County. Both of these properties have excellent wetlands on them which will be a valuable addition to the refuge system. However, FmHA has a policy which does not permit the recording of these easements until the properties are sold. Until the easements are recorded the refuge is not permitted to do any actual construction or rehabilitation on these lands, despite the availability of money for both materials and staff time. It is hoped that this problem is resolved in the near future as both of these areas need to be preserved. The refuge has plans to raise the spillway at the lower pond on the Nichols property which will double the size of the pond and

surrounding wetlands. Fence material has been purchased for the Thompson property which will bring current grazing practices under control. No changes occurred this year in the program.

## D. PLANNING

### 2. Management Plan

A second draft of the Dorris Public Use Management Plan was written late in the year. This delay was caused by the staff changes. The document will be sent to the R.O. for approval early in 1993, after the E.A. has been completed. (see H-16)

### 3. Public Participation

The refuge staff continues to meet with the Modoc County Fish, Game and Recreation Commission on a regular basis. Issues discussed with the Commission included fishery management at Dorris Reservoir, the Dorris Reservoir Public Use Management Plan and the Junior Pheasant Hunting program. In addition, the commission has requested that the refuge give serious consideration to a special deer hunt. Considerable discussion has taken place on this matter and it was finally decided that no action would take place until a valid data base on the "Refuge Deer Herd" could be gathered.

The commission continues to seek increased outdoor recreational activities and the refuge continues to cooperate with them as long as the proposed activities are compatible with refuge objectives.

E. ADMINISTRATION

1. Personnel

2

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1 - 4 - 5 - 3 - 2
MDC-3189, 06/09/92, J.Doebel.

1. David N. Johnson - Refuge Manager GS-11 PFT EOD: 09/92
2. Ronnie L. Ryno - Asst. Refuge Manager GS-09 PFT EOD: 11/91
3. Kevin J. DesRoberts - Administrative Support Assistant GS-05 PFT EOD:06/91
4. Bradley M. Storm - Maintenance Worker WG-08 PFT EOD: 09/88
5. Alan N. Kahlen - Maintenance Worker WG-08 PFT EOD: 09/91
6. Joyce Prisco -

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Specialist

GS-7

Temp,

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7. E. Clark Bloom - Refuge Manager GS-11 PFT EOD (not pictured)
8. Alan Kiser - Interpretive Specialist GS-5 Temp, (not pictured)

Several major personnel changes occurred in 1992.

Refuge Manager Clark Bloom transferred to Salton Sea NWR in June after being associated with this refuge for more than 19 years. He started here when this was still a satellite refuge. Clark survived many significant issues and battles during his tenure, and is fondly remembered by most of the people in the community. Those who don't have fond memories of him are the ones that could not accept his strong commitment to the resource and his ability to deny incompatible activities on the refuge. His dedication and hard work have left a positive mark on this place as evidenced by the significant production of a diverse wildlife population. Thanks Clark!

On September 2, l992, the Project Leader position was re-filled by David N. Johnson. David transferred to Modoc after serving as the Assistant Manager at Western Oregon Refuges, Malhuer, Arapaho and Ruby Lake refuges. In addition, he served as a biologist at Malheur, range-tech with BLM and biotech at Kenai NWR.

In late June 1991 Joyce Prisco was recruited to fill our Interpretive Specialist position. This position is a new one which was identified as a result of the recreational plan being developed for the Dorris Reservoir unit of the refuge. This position is mainly an enforcement position but has also proven to be effective in providing a means of one-on-one communication with the general public. Joyce has done an excellent job in bringing public use under control while developing a good rapport with the public. On June 6, l992, she resigned from her position to pursue a career in motherhood and family management. We wish her good luck. This position was filled again in October by Alan Kiser to assist in patrolling the waterfowl hunting program. The appointment is currently a temporary-part time and will terminate in January after the close of the hunting season.

The following table depicts a six year comparison of on-board strength for Modoc NWR.

Table 2. Staffing levels at Modoc NWR for the past six years.

| | Permanent | | Temporary |
|---|---|---|---|
| Year | Full Time | Part Time | |
| 1992 | 5 | 1 | 1 |
| 1991 | 5 | 2 | 2 |
| 1990 | 4 | 1 | 1 |
| 1989 | 4 | 1 | 1 |
| 1988 | 5 | 1 | 1 |
| 1987 | 4 | 1 | 1 |

3

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E. Clark Bloom, Refuge Manager
1974-1992, transferred to Salton Sea.

3. Other Manpower Programs

No T.E.A.C.H. enrollees were available for 1992. However, in October we became a host agency for Green Thumb Inc. which is an employment and training program for older Americans. The benefit of being a host agency is access to experienced quality labor at minimal cost to the station. At least one maintenance oriented position will be created next year with this program.

4. Volunteer Programs

The volunteer program at Modoc NWR has slowly grown into a viable part of the refuge work force, especially during the summer months. Over the last several years, a tremendous amount of work was conducted by volunteers that simply would not have been completed without them. This has been especially true with programs such as the riparian habitat study and routine maintenance chores such as vehicle washing and waxing.

The number of people volunteering increased this year, largely due to increased use of California Department of Forestry's Con Crews. Approximately 600 hours were volunteered.

The California Department of Forestry has a Conservation Camp near Alturas. A work crew of 17 inmates from that camp spent approximately 500 hours working on the refuge this year. Although the inmates are not volunteers in the true sense of the word, their work is free to the refuge and is considered to be volunteered as such. The "Con Crew" as it is known, removed old buildings and facilities on the new Clark acquisition and constructed fences on the Russell Ranch easement area.

5. Funding

Although funding was tight this year, we were able to conduct all planned projects while operating at our approved staffing level.

Table 3. Funding levels at Modoc NWR for the past four years.

| Year | 1230 | 1261 | 1262 | MMS | 6860 | 91XX | Total |
|---|---|---|---|---|---|---|---|
| 1992 | 5,000 | 163,000 | 78,000 | 82,000 | 5,000 | 7,500 | 340,500 |
| 1991 | 2,000 | 162,000 | 78,000 | 67,800 | 5,000 | 9,200 | 324,000 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1990 | --- | 165,500 | 62,000 | 15,650 | 5,000 | 21,700 | 269,800 |
| 1989 | --- | 126,700 | 85,100 | 29,400 | 5,000 | --- | 246,200 |

6. Safety

Safety meetings were held every month in an effort to increase safety awareness among staff members. This program is effective and the staff's attitude towards safety is a positive one. There were no accidents reported in 1992.

7. Revenue Sharing

The refuge manager presented a revenue sharing check in the amount of $32,578 to the Modoc County Board of Supervisors on 06/23/92. This check was 90% of the $36,375 which represents 3/4 of 1% (0.75%) of the fair market (appraised) value of fee lands located within the county. This amount has ranged from 63% to 92% within the past five years. Hopefully we will be at the 100% level next year and remain at that level in the future. Poor counties like Modoc rely very heavily on revenue sharing and anything less than 100% is not well accepted by the Board of Supervisors.

## F. HABITAT MANAGEMENT

1. General

Modoc NWR is located on the western edge of the Great Basin Desert. Drier sites are dominated by stands of sagebrush and juniper trees. Rabbitbrush, greasewood, and saltgrass associations are typically located on the poorly drained, more alkaline areas, while reed canary grass intermixed with sedges and juncus are common around the marsh units and on the wet meadows. These basic habitat types are considered to be climax communities and as such are very stable unless disturbed by a modifying factor, such as fire or very heavy grazing.

Significant habitat modifications this year involved a prescribed fire (section F-9), enhancement of riparian areas through tree planting project (section F-6), and construction of nesting islands in Teal Ponds (section F-2). The drought, however, dominated all aspects of habitat management (section B). As a result, the refuge was forced to pump well water for the first time.

2. Wetlands

Refuge wetlands are derived from a very complex irrigation system. The entire area is managed through the use of a water conveyance system which includes an 11,100 acre foot storage reservoir, 20 miles of major canals, 50 miles of minor ditches, a river, a creek, and several pond and marsh units. Water control structures within the system range in size from eight inch pipes to 60 inch corrugated metal pipes with attached risers to multiple-bay concrete dams.

This system provides water for the entire wetland area and is managed to produce the maximum of benefits with a minimum of labor. Planned annual operations included maintaining non-fluctuating water levels throughout the marsh/pond system while supplying a continuous flow of fresh water.
This proved to be quite a challenge in light of the worst drought in refuge history. Wetlands irrigated from Dorris Reservoir fared the best, largely due to water stored prior to this year's drought. A few small wetlands were allowed to dry in an effort to make the reservoir water last as long as possible. Maintenance workers did an excellent job of maintaining relatively stable (but somewhat lower than normal) water levels in the pond and marsh units despite an ever dwindling supply of water. However, by late July not enough water was flowing out of Dorris Reservoir to maintain water levels. In mid August the surface of the reservoir dropped to below the bottom of the outlet pipe on Dorris Dam and the remaining wetlands began to rapidly dry in the hot dry air.

Wetlands that rely on other water sources did not fair as well. Ponds and marshes dependent upon the South Fork of the Pit River such as those along the Highline Canal began to drop below normal levels in early March due to low flows in the river. By June the Highline Canal was dry as were most of the wetlands on the west half of the refuge. By the middle of August even the deepest ponds went dry.

Faced with no other source of water, an effort was made to activate the only irrigation well on the refuge. This well and pump were part of a land acquisition in 1975 and had never been used since. The power line into the well had been removed years ago, requiring a new one be installed by the power company and a right-of-way easement issued (section C-2). Because the water would have to flow a long ways in a new dry ditch, the decision was made to pipe the water to the closest wetland (Upper and Lower Duck Ponds) rather than dig a ditch to conserve what little water the well would produce. All this took precious time as the few remaining wetlands dwindled. Finally in late September water once again began to flow into Lower Duck Pond. Unfortunately, the drought impacted all neighboring farmers as well, and they too resorted to pumping from all available wells plus many newly drilled wells. As a result the water table dropped, and the only way the refuge well could recharge was to limit our pumping to 16 hours a day until well into the Fall after everyone else had stopped irrigating. Despite this shaky start, the pump was ultimately able to maintain about one half of Lower Duck Pond and a quarter of both Upper Duck Pond and Goose Pond. This proved to be the only water anywhere on the east side of the refuge, traditionally the closed area during hunting season.

Teal Pond had been scheduled for a routine draw-down long before there was any indication of this year's drought. This proved to be fortunate, as the water that would normally have been used to irrigate Teal Pond was instead used to maintain other wetlands much longer into the summer. The draw-down was carried out slowly over a three week period in late April and early May. In this way geese nesting on Teal Pond islands had time to hatch out their broods and move them to other ponds before Teal Pond went dry. This timing was also planned to coincide with the Spring shorebird migration. Because most seasonal wetlands in Northeastern California either never received any significant water or were dry by May, Teal Pond was the best habitat around, and use by shorebirds, ibis and other waders was heavy.

The Teal Pond levee was rebuilt as planned. More than thirty nesting island were either rebuilt or created and dense stands of Juncus and cattails were opened in the process. By the end of the year Teal Pond looked great despite being bone dry under the light coat of snow.



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Alan Kahlen uses the TD-20 to move rip-rap off the dike for placement along the enlarged Teal Pond Levee. MDC-3202 10/16/92 RLR

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Alan Kahlen uses the TD-20 to help Brad Storm load the scraper for island construction in Teal Pond. The Case tractor allowed for fast transport of materials and a quick turn around time which really helped speed up the project. MDC-3195 10/14/92 RLR

4. Croplands

Modoc NWR's farming program is conducted entirely by force account and is aimed at providing cereal grain for migrant waterfowl and Sandhill Cranes during fall migration. These grain fields have proven to be especially valuable in providing the necessary carbohydrates for Sandhill Cranes when staging for their fall flight to the Central Valley. Normally, grain fields are rotated on an annual basis between winter wheat or rye and spring plantings of barley. During 1992, a total of 145 acres were planted in winter wheat and 132 in barley. Additionally, 163 acres were planted with annual rye.

The only planting of barley was in the Matney Grain Fields where units 3,4,6,7 and 8 were planted. Winter wheat was planted in most of the northeast Ebby Field and all of the North Grain Field. Rye was planted in the Town Grain Field, part of the Ebby Field and Matney Fields 1, 2, 5 and 9.

Wheat and barley were planted at the rate of 100 lbs./acre while rye was drilled at 80 lbs./acre.

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Drilling winter wheat and praying for rain.
MDC-3198 10/14/92 RLR

Grain production was greatly limited by drought as one may expect. Fall plantings of wheat and rye sprouted well enough, but by late Spring were stressed enough from lack of moisture that they produced minimal grain. Spring planted barley did even worse. Some fields had almost no germination and even less grain. Other fields grew a fair number of short plants that produced a light crop. Despite the poor crop, however, goose, crane and deer use was heavy in all fields, especially winter wheat. This was due, in part, to a lack of food anywhere else. Wildlife literally ate the grain as fast as it formed, often long before it had a chance to mature. By the end of July, a mere human could not locate a single piece grain in any field, and there seemed to truly be 100% utilization. Unfortunately, this was at least a month and a half before the hungry migrants arrived.

5. Grasslands

Modoc NWR has 3000 acres of grasslands; 1000 acres are of the "bunch grass" type intermixed with sweet clover and cheatgrass which can be found on the better drained areas of the refuge. This community type is managed solely for waterfowl production, and is kept in an undisturbed state with no haying or grazing practices permitted. There was almost no growth this season due to a lack of water, leaving this habitat in very poor shape.

The remaining 2000 acres are maintained as irrigated meadows in order to provide succulent green browse for Canada Geese. In addition, these wet meadows provide excellent nesting habitat for Sandhill Cranes, rails, snipe, and phalaropes. Ducks, mainly Cinnamon Teal, also utilize these meadows to a lesser extent for nesting purposes.

This year there simply was not enough water to properly irrigate these meadows from the first day of the irrigation season. As a result, they did poorly. After haying, there was no water available at all, so these fields remained dry and brown with no way to produce Fall and Winter browse for geese.

6. Other Habitats

Sagebrush uplands are the common plant community in the drier portions of the refuge. These areas are frequently interspersed with greasewood/rabbitbrush stands adjacent to the low, poorly drained, alkaline areas on the refuge. These areas, which are slowly recovering from the results of overgrazing in the past, are providing excellent cover for quail, pheasants, deer and several species of passerines. Other native plants such as Great Basin Wild Rye and associated forbs are beginning to return. These areas will be kept in a non-use status by livestock in order to insure that there are some remnant stands of native vegetation on the refuge.

The riparian habitat associated with Pine Creek, which passes through the refuge for three miles has been in non-use status since 1983. Since the elimination of cattle grazing, the riparian habitat has improved significantly. An overstory of willow trees is slowly coming back as well as an understory of wild rosebush. Narrow-leaf cottonwoods that were planted in 1990 along some areas of the corridor have survived and hopefully will continue to grow and add to the diversity of this riparian corridor.

The refuge staff has been actively involved in a riparian habitat improvement project along the entire length of Pine Creek for the past ten years. This effort is designed to help mother nature in her recovery efforts by providing one to two year old saplings which have a higher success rate in becoming established. About 25 trees and willows were planted near the western end of the riparian corridor this year. In addition, replacement trees and willows were planted where mortalities had occurred in the previous winter. Work continued at maintaining previous plantings, with emphasis upon weeding and irrigation during the summer. Wire mesh fencing is also required to protect young trees from rabbits and the refuge's expanding deer herd. This habitat continues to improve, though deer are increasingly making a serious impact. (section G-8).

7. Grazing

The main objective of the grazing program has been to encourage growth of succulent green browse for migrating Canada Geese during the Fall and Spring. This practice also provides nesting, feeding and loafing habitat for Sandhill Cranes. To a lesser degree, the grazing program also provides loafing and feeding areas for the resident flock of honkers, keeping them off neighboring ranches as much as possible.

Grazing permits were issued to four permittees during 1992. John Younger was issued a permit for grazing on the South Pine Creek Field. Warren Weber's permit was for the Pine Creek Field while Bob Schluter had permits for the Town and West Hansen Fields. All permits were for Fall grazing only.

Rates for these three permittees were based on a rate survey conducted in November 1989 that established the fair market value for Summer grazing (May - August) at $10.50/AUM and the Fall grazing (September - November) rate at $8.50/AUM. These rates reflect a $1.00/AUM increase over those in effect during 1988 and 1989. A rate survey conducted in November of this year indicates that an increase in this rate is warranted.

The fourth permit was issued to Sean Curtis for Fall grazing of the Bayley Field at a rate of $15.00/AUM. This was the second year of a three year permit that was awarded as a result of competitive bidding. This was the third permit to be issued on the basis of a bid system. This system was chosen to reduce complaints by permittees that refuge rates are too high, and to better reflect the real "market value" of this commodity. Long term permittees who were granted "grandfather" permits when the refuge was established will continue to have their permit rates based on rate surveys.

Because no water was available to irrigate the meadows following haying, there was no green-up and no new feed for cattle. As a result, grazing was limited to what was not cut during haying. This limited amount of forage on the refuge caused some permittees to put out both fewer cattle and for shorter periods of time than normal, resulting in reduced AUM's consumed and total revenue generated. The following table depicts grazing on Modoc NWR during the past five years.

Table 4. Five Year Summary of Grazing Activity

| Year | # Permits | # AUM'S | Total Revenue |
|---|---|---|---|
| 1992 | 4 | 931 | 8,160.12 |
| 1991 | 4 | 1278 | 11,647.83 |
| 1990 | 5 | 1077 | 9,482.09 |
| 1989 | 5 | 1027 | 8,296.55 |
| 1988 | 4 | 1345 | 10,803.58 |

8. Haying

Approximately 2000 acres of irrigated meadows exists on the refuge, of which roughly 1600 acres are hayed annually. The haying program, combined with the grazing program, is an effective and economical tool used to provide short green browse for Canada geese. The resulting short vegetation the following Spring also allows the water in the meadows to warm sooner, thereby providing an abundant food source of invertebrates which are so important to nesting Sandhill Cranes.

Six special use permits for hay cutting were issued in 1992. One was a grandfather permit, while the other five were awarded on the basis of the bid system. The grandfather permit was set at $12.00/ton based on a rate survey conducted in November 1989. A rate survey conducted in November of this year indicated that the current rate of $12.00/ton is far short of the fair market value for refuge hay.

This was the third year of the three year permits for Johnson Stock Company and R.A. Stanford at $15.80 per ton. It was also the third year for Stephen Nelson at $20.77 per ton. When that bid was originally received it was considered an unbelievable price. Two years ago, however, two permitees matched the high bid of $37.00 a ton for meadow hay. Now, anything is believable, further adding to the evidence that a rate increase is due for the grandfathered permit.

During the 1992 season, a total of 1,695.42 tons of meadow hay were harvested from the refuge for a total revenue to the government of $31,315.05. Like everything else this year, these figures are well below average due to the drought. There simply was not enough water available to properly irrigate any of the meadow hay units. The maintenance staff, however, deserves special credit for the excellent job they did of getting the most out of what little water there was. Without their fine work, the hay harvest would have been much less.

Following removal of the hay, meadows are normally flooded to provide green browse for geese. This Fall there was no water and all meadows remained dry well into Winter, far too late for any green growth.

9. Fire Management

There were only prescribed burn conducted in 1993. An attempt was made to burn the Front Field but it was quickly called of when it was discovered that this year's wet weather had allowed the water table to remian near the surface all summer and resulted in far too much fuel moisture for the duff to burn, let alone carry a fire. Two other planned burns had to be postponed until 1994 due to wet conditions.

The one successful prescribed burn was at the south end of Goose Pond. This marshy area had not been burned in well over 10 years and had become completely over-grown with matted Reed canarygrass and cattails. The burn was conducted on Sept. 21 and 22, and very good results were achieve. Nearly all the cattails were burned and a good mosaic was created in the canarygrass. The greatest benifit of the burn was several small peat fires. While such fires can be a problem, this field is surrounded by water and was flooded to extinguish the fires. The resulting shallow depressions created excellent interspertion of open water in what had been a sea of canarygrass.
There were no wildfires on the refuge during this past year.

10. Pest Control

Again this year, the refuge assisted with Modoc County in the control of Scotch thistle on refuge land. This is a cooperative program in which the refuge pays for one-half of the cost of chemicals, use of equipment and county labor to control thistle on portions of the refuge that our own staff are unable to treat. In 1993 the refuge paid $600.00 to Modoc County for this service. The county used the chemical "Weedmaster" as they have for the last few years.

During Spring and early Summer, refuge personnel sprayed the herbicide Rodeo, mixed at 1% solution, to control scotch thistle on the main portion of the refuge. More than 35 acres were treated. Although the County Agricultural Commissioner recommends more toxic chemicals, Rodeo appears to have good success in killing plants with one treatment and is more desirable for use near wetlands. Control of this large agressive "Class A" noxious weed continues to be a major cost to the refuge both in terms of limited budget and man power. As a result, an unsuccessful attempt was made to locate a biological control agent for Scotch Thistle during 1992. Modoc NWR, however, continues to be the number one potential release site being considered by the California Department of Agriculture in their effort to find such a biocontrol.

Poison hemlock is another weed that can be aproblem on the refuge. For years this weed was sprayed along levees, but this control technique has been discontinued as it only created large bare areas that were quickly invaded by weeds, primarely more hemlock. Hemlock continues to be mowed along roads where it presents a safety problem.

As in the case with other introduced weeds, a biocontrol agent for poison hemlock would be quite desirable. During 1992 the Regional Integrated Pest Management Coordinator was consulted. He recommended the leaf-tying moth Agonopterix alstroemeriana. Assistant Manager Ryno traveled to neighboring Siskiyou County where an entomologist from the California Department of Food and Agriculture showed him poison hemlock infested with this moth. All hemlock was severely impacted, and it was quite obvious that the insect had this wide spread weed under control. Unfortunately, upon returning to the refuge it was discovered that A. alstroemeriana was already living on poison hemlock throughout the refuge with little or no impact to its host. Two possible theories were submitted as to the differences noted between the Siskiyou County site and the refuge. The leaf-tying moth has only recently been introduced into the U.S. It is possible that it has not been in Modoc County long enough to reach a density high enough to affect hemlock as the plant is so abundant on the refuge. Limited records indicate that the moth has been in Siskiyou County longer. Secondly, the refuge has a significantly shorter growing season than the area of Siskiyou County when the moth was so effective. It is possible that the moth may not have proper climatic conditions to control its host. Luckily during 1993 the leaf-tying moth had a major impact on hemlock indicating that the first theory is correct. At least 90% of the hemlock on the refuge was impacted with much of it being reduced to twisted yellow stems with few leaves and little seed production. In addition to limiting the amount of seed, this biocontrol seems to weaken and possiblely kill some seedlings. Unfortunately older established plants of this long lived perannial are not killed by the moth larve and the insect has no impact until the plant is more than half grown. By this time the large hemlock plants have already out competed more desirable vegetation.

Canada thistle is a yet another species of weed that is a problem and subject to control on the refuge. This introduced weed is common in any area with miost soil or subirrigation. It is especially a problem in grain fields where discing only increases the number of plants. Approximatly 40 acres of grain were sprayed with 2,4-D with good results.

Because Canada thistle occurs both in cultivated fields as well as in areas left untreated for nesting and escape cover, this is another species that would ideally be treated with a biocontrol. To this end, on June 3, 1993 1250 stem gall flies (Urophora cardui) were released, evenly divided between the Warm Springs near Headquarters and along the Flournoy Pond Levee. Both sites were closely veiwed in the fall and no sign of any galls were found. Unfortunately the Biocontrol and IPM section of the California Department of Food and Agriculture has attempted to establish the stem gall fly on Canada thistle in the Tulelake Basin in past years. While a few galls were found some years, the flies never established a viable population and never impacted the growth or seed production of Canada thistle.

During April, maintenance workers placed 200 gas cartridges in squirrel burrows in Dorris Dam in an effort to control an infestation of these burrowing rodents. This was only a small portion of the intensified dam safety and maintenance program that was initiated in 1990.

## 11. Water Rights

Modoc NWR is fortunate to have secure water rights on two creeks which drain portions of the Warner Mountains watershed lying east of the refuge. The refuge retains 52 percent of the total water rights within the Pine Creek irrigation district, the major water source for the refuge. A significant water right is also possessed on Parker Creek. Winter-time diversions from

both of these creeks are used to fill Dorris Reservoir. These stored waters are utilized during spring and summer to irrigate refuge hay meadows and maintain ponds and marshes at stable levels.

Refuge water rights are enforced through a state watermaster service which cost $5,800.00 this year. In 1986 the state watermaster suggested that we apply for a change in "purpose of use" on our water right decree for Pine Creek since the original purpose of use was for "Agriculture". It was suggested that we request that "wildlife and recreation" be added to our purpose of use. We complied and submitted an application in 1987. Upon receiving notification of our application, virtually every water user on Pine Creek and several downstream users on the Pit River filed a protest.

Engineer Richard Johnson in the Regional Office Division of Engineering responded to these protests and a hearing was originally scheduled for January, 1989. This hearing was rescheduled for December, 1989. However, a pre-hearing was held in its place on December 7, 1990 in Alturas to give the protestants an opportunity to voice their opinions and have individual specific questions answered. The pre-hearing was conducted by three representatives from the California Department of Water Resources and was chaired by a member of the Water Resources Board. Prior to this meeting, a tour of the refuge water system was conducted by refuge personnel to let all interested parties become familiar with how water is used on the refuge.

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Clark Bloom hosted a water management workshop to explain how, why and when the water is used on Modoc Refuge, prior to the formal hearing in Sacramento. MDC-3038 5/27/92 RLR

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USFWS attorney Barbara Scott-Brier and R-1 hydrologist Dave Langman relax after dinner, prior to the Sacramento water rights hearing.MDC-3042 5/28/92 RLR

Many of the Pine Creek water users who had earlier protested, learned that there was no basis for their protests and have tentatively agreed to withdraw pending an agreement that the refuge will not maintain refuge pond levels by direct diversion from Pine Creek.

After 2 1/2 years of delay a hearing was scheduled by the California Division of Water Resources to consider petitions to authorize additional uses of water for licensed water rights applications 760, 1042, 12273 and permitted water right application 1321. Prior to the hearing, a significant research effort was made by the refuge staff, the Regional Office Division of Water Rights and the Regional Solicitors office to document and expose all pertinent information. Barbara Scott-Brier took the lead from the Solicitor's office by reviewing and compiling information from refuge staff, refuge files, Robert Oser (R-1 water rights coordinator), David Langman (R-1 hydrologist), Richard Johnson(R-1 engineer) and outside concerns.

The hearings took place in Sacramento on June 17 and 18 and significant testimony both for and against the petition was presented by many different parties. As expected downstream water users on the Pit River provided the major objections to the proposal. Malacha Hydro Limited Partnership and Big Valley water users are concerned about the storage and use of water which (in their estimation) would prevent them from using the water. However, the information presented by the R.O. and refuge staff provided a strong and convincing argument that the changes in how water is used will not significantly change the amount of water which flows down the Pit River. We are awaiting the final decision of the Water Resources Board which is expected to be announced in 1993.

Another major issue which affected water rights administration in 1992 was the effects of six years of drought on the whole water system. Extremely low run-off coupled with private demands and stock water needs made every drop of water very crucial. The east 1/2 of the refuge was completely dry and Dorris Reservoir fell far below the outlet level.

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Assistant Manager Ryno is able to walk-on-water when taking current meter readings to document flows.MDC-3176 9/11/92

## G. WILDLIFE

### 1. Wildlife Diversity

An abundance of wetland habitat combined with riparian areas, wet meadows and uplands at Modoc NWR, supports a high diversity of wildlife species. Two hundred and thirty-eight species of birds have been observed and 78 species have been documented as nesting on the refuge. The riparian corridor along Pine Creek offers the highest diversity of wildlife habitat. This area continues to be enhanced through plantings and protection from grazing, while being monitored for species trends.

### 2. Endangered and/or Threatened Species

The refuge hosts two federally endangered species; the Bald Eagle and Peregrine Falcon.

Peregrine Falcons were observed four different times throughout the year.

Bald Eagles can be observed on the refuge during the winter months when they utilize the refuge as a wintering area, foraging on the remaining waterfowl and road kills. The number of eagles peaked during December and January when 8 birds were present. Total use days for the year were about 630.

### 3. Waterfowl

#### a. Ducks

Duck utilization of the refuge was similar to 1992 with 1,156,560 use days for the year. The number of ducks on the refuge peaked in October when about 11,000 were present. October is usually the peak of migration when upwards of 25,000 ducks are present.

Goose Pond was drained this year to permit building of nesting islands. An estimated 30 nesting islands were built and/or repaired.

The following table depicts estimated duck production on Modoc NWR for the past five years.

Table 5. Estimated duck production on Modoc NWR 1989-1993.

| Species | Objective | 1993 | 1992 | 1991 | 1990 | 1989 |
|---|---|---|---|---|---|---|
| Mallard | 2000 | 1098 | 1409 | 492 | 515 | 861 |
| Gadwall | 1800 | 774 | 1472 | 482 | 770 | 625 |
| Northern Pintail | 500 | 48 | 123 | 43 | 64 | 55 |
| Cinnamon Teal | 2500 | 409 | 800 | 324 | 841 | 555 |
| American Wigeon | 200 | 98 | 200 | 61 | 125 | 39 |
| Northern Shoveler | 200 | 170 | 322 | 92 | 276 | 398 |
| Redhead | 600 | 359 | 339 | 457 | 271 | 351 |
| Ruddy Duck | 300 | 171 | 50 | 290 | 270 | 381 |
| TOTALS | 8100 | 3127 | 4567 | *2241 | 3132 | 3265 |

* - Total production for some species is probably overestimated due to the effects from the flooding that occurred in May.

b. Geese 1993

Canada Goose utilization of the refuge was similar to last year with total estimated use days at 666,565

Great Basin Canada Geese numbers peaked during the months of December when about 3,400 birds were present. Great Basin and Lesser Canada Geese represented 91% of the total use days. Cackling Canada Geese primarily use Dorris Reservoir by eating alfalfa which grows on adjacent private land, and then loafing on the reservoir, the Hwy 395 ponds are also a favorite loafing area for them. White-fronted Goose numbers peaked duing April at 1,240, representing about 8% of total use days. Snow and Ross geese rounded out the remaining 1%.

Nesting success survey indicated in a 63% success rate for the main refuge and insufficient data was collected for Dorris Reservoir. The average brood size was 4.02 for the main refuge. The main portion of the refuge attributed 96% of the total production and Dorris Reservoir attributed 4 percent. Main refuge nest success and brood size data was used with Dorris Reservoir pair counts to estimate production for Dorris Reservoir.

c. Swans

Tundra Swans utilize the refuge during migration as a staging area with the highest concentrations occurring in late winter and early spring. Total use days were up considerably from previous years with peak numbers of 1355 birds during April. Use days totaled about 54,690. A pair of collared Trumpeters spent several weeks at the refuge during the month of February.

4. Marsh and Water Birds

Sixteen species of marsh and waterbirds utilized the refuge throughout the year for an estimated 53,940 use days. Numbers peaked during late July and August.

The Central Valley population of Greater Sandhill Cranes is presently listed by the State of California as a threatened species. Modoc NWR is the most important nesting area in Northeastern California, so special emphasis is placed on habitat management and data collection.

A breeding pair count was conducted on May 26, and a total of 27 pairs and 35 nonbreeding cranes were counted.

Nesting surveys were conducted from mid-April through the end of May and five nests were located and monitored to determine success. Refuge nests monitored consisted of: three located in pond margin, one in wet meadow and one in marsh habitat located 50 feet from a county road.

Four nests (80%) were succesful. The unsuccessful nest was abondoned due to flooding.

A crane production survey was conducted during the first week of September. At that time 14 colts had fledged. The average brood size (14 colts/9pairs) was 1.56. The recruitment to the Refuge breeding population [14 colts/54 adults] was 26 percent.

Table 7. Sandhill crane production at Modoc NWR for the past ten years.

| | | Nesting | Nests | Successful Nests | Colts | Percent |
|---|---|---|---|---|---|---|
| Year | Pairs | Located | Number | Percent | Fledged | Recruitment |
| 1993 | 27 | 5 | 4 | 80 | 14 | 26 |
| 1992 | 36 | 11 | 8 | 73 | 14 | 19 |
| 1991 | 35 | 16 | 7 | 44 | 6 | 9 |
| 1990 | 34 | 21 | 16 | 80 | 10 | 15 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 1989 | 25 | 19 | 13 | 68 | 13 | 26 |
| 1988 | 30 | 22 | 11 | 50 | 8 | 13 |
| 1987 | 28 | 15 | 15 | 100 | 14 | 25 |
| 1986 | 32 | 21 | 14 | 66 | 20 | 31 |
| 1985 | 30 | 25 | 19 | 76 | 11 | 18 |
| 1984 | 27 | 14 | 8 | 57 | 5 | 9 |
| 1983 | 26 | 29 | 13 | 45 | 11 | 21 |

Crane banding operations were conducted on the refuge from April through September. A rocket net was set up in the Matney Field, and juvenile cranes (8-9 weeks old) were captured on foot. The rocket net was unsuccessful this year but we were able to capture and band two juvenile cranes on foot.

5. Shorebirds, Gulls, Terns and Allied Species

Twenty-seven species within this category have been observed on the refuge at one time or another. During 1993, 22 species utilized the refuge for a total estimated 74,520 use days. Ring-billed Gulls accounted for 40% of the total use days. The peak use occurred in late July and early August.

The following species were documented as nesting on the refuge, but production was not determined: American Avocet, Black-necked Stilt, Killdeer,, Long-billed Curlew, Willet, Common Snipe, Wilson's Phalarope, and Forster's Tern.

6. Raptors

A total of 17 species of raptors were observed utilizing the refuge during 1993 for an estimated 11,310 use days.

American Kestrels, Great-horned Owls, Barn Owls, Short-eared Owl, Northern Harriers and Red-tailed Hawks were documented as nesting on the refuge, but production was not determined.

There was one noteworthy change in the owl population. Both Great-horned and Barn Owls did not leave the refuge when the snow drove away every other potentially migraratory bird species. As a result, numerous dead owls were found on the refuge and even after nesting season and owls had fledged, there were at least 50% fewer owls of both species than in the previous several years.

7. Other Migratory Birds

Common Raven use remained basically unchanged from previous years. Raven use occurred sporadically during most of the year. However, raven use of the refuge increased quite suddenly when ducks began to nest, and ravens were frequently noted carrying duck eggs. As young waterfowl fledged, raven activity on the refuge rapidly dropped off. This pattern of raven activity began on the refuge in the mid 1980's and continues.

This year marked the tweleth year in a row that a mist netting project in riparian habitat was conducted on the refuge. During the course of the year, 24 days of effort were put into the project as compared to last year's 30 days (Table 7). Fully 95% of the effort was conducted on a volunteer basis by the assistant manager on weekends or by qualified volunteers.

Table 7. Riparian habitat mist netting project in 1993.

| | |
|---|---|
| Total Days of Operation | 24 |
| Total Net Hours | 501.5 |
| Birds per 100 net Hours | 155.33 |
| Total Birds Captures | 792 |
| Total Number of Species | 41 |
| Largest Daily Catch (9/28/93) | 141 |

The mist netting project, which began in 1982, was designed to monitor the breeding population of Yellow Warblers and Willow Flycatchers. The Yellow Warbler has since been dropped from the sensitive species category, but it is still monitored as an indicator species. The Willow Flycatcher is still considered as a sensitive species and as such will be monitored when present

on the refuge. Both species utilize riparian habitat on the refuge for both nesting habitat and foraging habitat during migration.

The riparian habitat improvements being carried out by refuge staff and volunteers will offer increased habitat which will hopefully be utilized by Willow Flycatchers as well as other species dependent upon riparian habitat, especially during migration. Data gathered over the years have shown an increased usage trend by both Willow Flycatchers (Fig.1) and Yellow Warblers (Fig.2). The sudden down trend for Willow Flycatcher may or may not be a result of the drought and will require continued monitoring.

Figure 1. Willow Flycatcher Population Trends on Modoc NWR.

Figure 2. Yellow Warbler Mist Net Captures on Modoc NWR.

Table 8. Comparison of mist net data for the last five years.

| | Captures per 100 mist net hours | | | | |
|---|---|---|---|---|---|
| Species | 1989 | 1990 | 1991 | 1992 | 1993 |
| All species | 157 | 113 | 106 | 61 | 155 |

| | | | | | |
|---|---|---|---|---|---|
| Willow Flycatcher | 2.8 | 2.4 | 3.6 | 1.7 | 0.8 |
| Yellow Warbler | 21.7 | 7.6 | 6.1 | 3.9 | 23.3 |

The mist netting activities over the past twelve years have also been very valuable in documenting use by other passerines. Besides indicating species diversity and migration times, a total of 14 accidental species were documented as occurring on the refuge. Without netting activities, it is highly unlikely that any of these 14 species would have been documented as occurring on the refuge.

The recent degradation of rain forests and other habitat problems, both natural and human-caused, appear to be causing significant changes in population of passerine birds. In order to contribute to the understanding of the factors causing these changes, the refuge has modified its ongoing mistnetting program to fall in line with the parameters set forth by the Institute for Bird Populations in their Monitoring Avian Productivity and Survival (MAPS) project. This project utilizes a methodology of constant effort mist-netting during the breeding season, and provides estimates of annual post-fledging productivity by the ratio of young to adult birds captured, estimates of annual survivorship by the between-year return rates of adults, and estimates of annual breeding population levels and total numbers of adults captured. The methodology of this project is very similar to the study the refuge had been conducting for 12 years making modification easy.

8. Game Mammals

a. Mule Deer

The Mule Deer population on the refuge had an extraordinary year in 1991 due to favorable winter weather conditions. This was followed by the drought that ushered in 1992. This "non-existent" winter allowed for virtually no winter kill and the refuge's growing deer population continued to expand unchecked. Herd composition surveys indicated a summer fawn/doe ratio of 90 fawns per 100 does; quite high considering the large number of yearlings produced the previousin year's bumper crop. By mid 1992 there were between 35o and 400 deer on the refuge and the stage was set for troble.

As is often the case for big game, too much of a good thing can be bad in the long run. The mild winter that improved deer survival also produced drought. As the refuge literally dried up and deer ate themselves out of house and home, they crowded on to neighboring grain and alfalfa fields. Throughout Fall sick and dying deer were noted, most with symptoms of Blue Tongue. This was all mote, though, once the heavy snows of January 1993 began. Northeastern California deer herds suffered 50% to 90% motality during the first three moths of this year. Prior to fawning the 350 to 400 deer on the refuge had been reduced to about 60. Interestingly, even with plenty of water, a bumper food crop and few deer to compete with or spread disease, deer continued to die during 1993 at an unusually high rate, most showing classic Blue Tounge symtoms.

There is some good in everything, however. The crash in the deer population has given refuge woody riparian vegetation a chance to grow for the first time in over ten years. Hopefully the riparian habitat can get established faster than the deer herd rebounds.

b) Pronghorn Antelope

As usual, pronghorn were observed on the refuge from May through November. The Town Grain Field was used by a small number of does for kidding and the Pine Creek Field was used to a lesser extent. Unfortunately, pronghorns experienced the same excessive winter mortality as deer (see above).

c) Cottontail Rabbit

The Cottontail population on the refuge crashed during early 1993 due to the combination of drought leading into heavy prolonged snow cover. However, no actual counts are made and actual numbers are unknown. Cottontails and jack-rabbits are now scarse in this area.

10. Other Resident Wildlife

As with the mammals described above, all resident wildlife was hit hard by the snowy winter. Especially hard hit were the Ring-necked Pheasants. Once all the waterfowl migrated out, Bald and Golden Eagles as well as some mammalian predators turned largely to a diet of pheasant. The mild weather of the past few years had resulted in a huge population of pheasants, but by the time the snow melted in late March only about 10% of the refuge pheasants remained.

11. Fishery Resources

There are 16 species of fish known to occur within the various waters of the refuge. These species include: Pit-Klamath brook lamprey, Goose Lake redband trout, Sacramento sucker, hardhead, pit roach, Sacramento squawfish, speckled dace, tui chub, pit sculpin(all native species) and brown trout, rainbow trout, bluegill, green sunfish, largemouth bass, brown bullhead, and channel catfish (all introduced species). Of all 16 species, only the rainbow trout, brown trout, Channel Catfish, Bullhead, and Largemouth Bass are considered to be of any recreational importance.

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Members of the local bass fishing club donated time and effort to anchor bundles of expired Christmas trees in Dorris Reservoir as escape habitat for young bass. MDC-3050 12/30/94 DNJ

15. Marking and Banding

As required by the Annual Work Plan, Modoc NWR again participated in the pre-season Mallard banding program. Portable swim in traps were added to the banding arsenal this year. These portable traps gave us access to areas on the refuge otherwise not accessable with bigger, heavier traps. These smaller traps added significantly to our number of local birds banded.The Assistant Refuge Manager, and Administrative Support Assistant took turns tending the nine swim-in traps from August 1st through August 31. The overall results are summarized in Table 9.

Table 9. Waterfowl Banding Accomplishments for 1993 by age class.

| | MALE | | | FEMALE | | |
|---|---|---|---|---|---|---|
| | **AHY** | **HY** | **LOC** | **AHY** | **HY** | **LOC** |
| Mallard | 253 | 64 | 90 | 280 | 92 | 71 |
| Gadwall | | | 17 | 8 | 1 | 11 |
| Pintail | | 1 | 4 | 1 | 6 | 2 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shoveler | | | | | | | | | 1 | | | |
| Wigeon | | | 2 | | | | | | | 2 | | |
| Redhead | | | | 5 | | | 4 | | | | 11 | |
| Cinnamon Teal | | 13 | 3 | | | 4 | | 13 | 4 | | | |
| | | | | | | | | | | 253 | | |
| 78 | 121 | | | 297 | 113 | 101 | | | | | | |

TOTAL BANDED 963



16. Disease Prevention and Control

There were no documented large scale disease outbreaks on the refuge this year. Ample water was available all year and hepl reduce the threat of botulism. Ponds probably dried up too fast to create favorable conditions for an outbreak. Despite the huge reduction in deer number, several mule deer were known to have died from Blue Tongue disease (See Sect. G - 8 a).

H. PUBLIC USE

1. General

Public use of the refuge during 1993 included a variety of recreational activities by both consumptive and nonconsumptive users. These activities included warm water fishing at Dorris Reservoir, wildlife observation, waterfowl hunting, environmental education, and a special junior pheasant hunt. The return of plenty of water not only increase wildlife use but also had a similar impact on public use. A total of 24,203 visitors were recorded in 1993, nearly double the visits tallied in 1992.

The refuge contributed 10 news releases to local and regional newspapers, covering such topics as waterfowl hunting, the junior pheasant hunt, andfishing and the Dorris Reservoir recreation program. The local newspaper owner and editor are supportive of the refuge and it's programs and have been cooperative in helping us provide information to the public.

2. Outdoor Classrooms - Students

Various school groups from around Modoc County participated in the refuge's environmental education this spring. This program, through the use of an outdoor classroom setting, provided each group with introductions to wildlife ecology, wildlife management and methods of achieving refuge objectives through various refuge programs. A total of 565 students, representing almost every classes, school in the county, participated in this program. Each group of students were presented a program by refuge personnel and then taken on an interpretive hike or drive around the refuge, during which time more specific information was provided on various wildlife related topics. all presentations were well received.



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Kevin DesRoberts gives a wildlife outreach demonstration
to a group of 1st graders. MDC-3058 6/13/92 ECB

5. Interpretive Tour Routes

The two and a quarter mile automobile tour route surrounding Teal Pond is the main route used by visitors for birdwatching, photography and wildlife observation. In addition to the Teal Pond Loop, U.S. Highway 395 and County Road 115 which both pass through the refuge, are also used extensively by the public for wildlife viewing.

6. Interpretive Exhibits/Demonstrations

The interpretive Kiosk, erected at headquarters in 1986, continues to receive positive public reaction. The seven panel exhibit explains refuge management activities, goals and objectives, with emphasis upon Sandhill Crane management. Throughout the year a total of 3976 visitors were recorded at this facility.

7. Other Interpretive Programs

Refuge personnel participated for the third year in a program initiated by Modoc High School in Alturas. As part of the California Partnership Academies, a Natural Resources Academy Program was created for high school students interested in pursuing a career in natural resources. This program involves cooperation and support from state and federal agencies and provides students with education and work experience in the natural resource field, preparing them for college and careers. All classes in the program are part of the students curriculum and are accredited. The refuge participated in the program during 1993 as a supporting member; providing assistance in curriculum development, career opportunity information and field trips.

8. Hunting

During 1993, continental duck numbers remained below population target levels resulting in hunting regulations remaining similar to those of the past six seasons. The 59 day duck season extended from October 9 through December 6, 1993. Goose season ran concurrent with duck season, then continued until January 9, 1994.

In keeping with a national recreation user fee, the refuge initiated a fee system for the only controled hunt, opening weekend of the waterfowl season. Successful applicants were require to submit $10 before they were mailed a permit. In general, this new fee was accepted buy the hunters, as they were used to paying for similar controled hunts elsewhere. From a practicl stand point, the user fee created more work for the refuge staff, while resulting in no change for the hunter other than paying the $10.

As usual, duck hunting peaked the opening weekend then declined. Goose hunting was also typical. Hunter success was good on the opener, slow until mid November and good from Thanksgiving to the end of the season. A total of 1835 hunters took

1425 ducks and 502 geese The most numerous ducks harvested were as follows: 628 Mallards, 444 Gadwalls, 179 wigeon, 96 pintails and 46 Green-winged Teal. Except for four White-fronted Geese, all geese were Canada Geese.

The season was about what would be expected. When compared to the five year average (Table 11), there were slightly more hunters who took home slightly more ducks and a few less geese than average. Hunting was greatly improved over last year, both in terms of the number of hunters and their relative success. As one would imagine, the end of the drought was good news for both waterfowl and waterfowl hunters. This year's excelent food and water conditions may have limited hunter success somewhat, however, as there were lots of places for birds to go in Modoc County other than the refuge hunt area.



Table 11. Waterfowl Hunting statistics on Modoc NWR for the past five years.

| | 1993 | 1992 | 1991 | 1990 | 1989 | 5 year average |
|---|---|---|---|---|---|---|
| Total Hunters | 1835 | 1173 | 2268 | 1459 | 1477 | 1642 |
| Total Ducks | 1425 | 616 | 1536 | 1050 | 894 | 1104 |
| Total Geese | 502 | 420 | 821 | 692 | 330 | 553 |
| Total Snipe | 5 | 0 | 12 | 39 | 31 | 17 |
| Total Birds | 1932 | 1036 | 2369 | 1781 | 1255 | 1675 |
| Ave Bird/Hunter | 1.05 | 0.88 | 1.04 | 1.22 | 0.85 | 1.02 |

For the second time, the refuge allowed pheasant hunting. The special "junior" pheasant hunt was held during the first three Sundays of the general pheasant season. Hunting was by advanced reservations only and limited to those people with a junior hunting license. Pheasant hunting was restricted to a maximum of 21 hunters a day. Unfotunately, while the heavy snows than ended the drought brought good news for waterfowl and waterfowl hunters, those same snows spelled doom for most pheasants. Few pheasans survived the deep snow, and lack of food following last year's drought. In addition any animal that could migrate, left the refuge during the deep snows, leaving pheasants as the only prey base for all the resident predators (see sec. G-10). Pheasant numbers were reduced by at least 90% by the end of the hard winter resulting in poor hunting the following November.

Despite the low number of birds, about three quarters of the hunters jumped between one and three roosters. The combination of the challange of hunting wild pheasants and the young hunters' inexperience with such a difficult quarry resulted in no birds being taken during this year's hunt. That did not seem to dampen the hunter's enthusiasm much, though.

Based upon two years' experience now, it seems that most these new hunters need to flush an average of at least five to 10 roosters apiece to have much of a change of bagging one of these strong-flying and elusive birds.

9. Fishing

During the Spring and early Summer, Dorris Reservoir normally produces fair to good catches of Largemouth Bass, Brown Bullheads and Channel Catfish for local fishermen. With the return of good run-off, fishing improved at the reservoir over last year. Most reservoirs in Modoc County went dry in 1992 and has nothing to offer the angler this year. Dorris Res.,however, retained enough water in dead storage to provide some carry over and this attracted 4970 fishermen.

As in past years, the refuge awarded a contract for caretaker services for Dorris Reservoir that included opening and closing the gates on a daily basis and cleaning the restroom facilities. For te second consecutive year, this contract in the amount of $1,200.00 was awarded to Aaron Fieguth for the six month period that the reservoir is open for public use by vehicle access.

11. Wildlife Observation

Wildlife observation centers around waterbirds observed from the Teal Pond tour route. However, interest in raptors and passerine species has grown noticeably over the past several years. Viewing mule deer from the county roads is also a popular attraction, particularly with local residents during the Fall. As Table 12 below indicates, wildlife observation at the refuge continues to increase. There is an artificially high increase between 1989 and 1990 due to a change in documenting this use that more accurately estimates refuge visitation. This same method has been used every year since. The huge jump in use between 1992 and 1993 shows that both the public and wildlife responded to the return of water in a big way.

The only aspect of wildlife observation visits to drop off in 1993 was mule deer viewing. During 1992 many locals would come out to the refuge after dinner to watch the large number bucks feeding in the grain fields. After the winter kill there was not much left to view (see sec. G-8a).

Table 12. Wildlife observation visits on Modoc NWR 1983-1993

| Year | Number of Visits |
|---|---|
| 1993 | 10,331 |

| | |
|---|---|
| 1992 | 7,580 |
| 1991 | 7,730 |
| 1990 | 5,390 |
| 1989 | 2,100 |
| 1988 | 2,540 |
| 1987 | 2,395 |
| 1986 | 2,155 |
| 1985 | 2,900 |
| 1984 | 2,640 |
| 1983 | 1,350 |

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This group of birdwatchers from the Eagle lake chapter of the Audubon Society was thrilled with the diversity of species seen at the sub-headquarters. MDC-2988 3/29/92 RLR

12. Other Wildlife Oriented Recreation

Due to the scenic beauty of the refuge and the abundant photographic opportunities available around the refuge, photography is a popular activity among refuge visitors. Primary photographic subjects include waterfowl, Mule Deer, Sandhill Cranes and raptors. Because of Sandhill Crane sensitivity to disturbance during nesting, much of the refuge is closed to public entry, thus limiting photographic activities to the area around the tour route. Plans are underway for the construction of at least one photo blind that will be made available to the public.

16. Other Non-Wildlife Oriented Recreation

Waterskiing is a popular activity at Dorris Reservoir. However, the potential conflict between waterskiing and wildlife needs, fishing, wildlife observation and esthetics is obvious. Efforts to regulate this potentially incompatible activity were finished in 1992 after a three year public planning process. Wateskiing is now limited to a marked corridor and only allow between June 1 and September 30 thus avoiding spring and fall migration and conflicts with nesting waterfowl. While not everyone is happy with this compromise, skiers still have a place to go close to town and their recreational activities have little impact upon wildlife.

17. Law Enforcement

The law enforcement program at Modoc NWR is focused upon the public waterfowl hunting program with emphasis upon preventive law enforcement during the Fall and Winter. Because of the large amount of public use at Dorris Reservoir, law enforcement is needed there during Spring and Summer.

During the waterfowl hunting season, enforcement activities are conducted under an established routine with at least one refuge officer on duty during a portion of nearly all the scheduled 42 shoot days. Besides enforcing the law in both overt and covert fashions, refuge officers conducted bag checks and answered numerous questions from the public.

Compliance is very good among refuge waterfowl hunters as they know the chance of being checked by a warden on Modoc NWR is hundreds of times greater than anywhere else in the county. Those hunters that chose to violate hunting regulation on the refuge know that thay have put a lot of effort in to their plan.

## I. EQUIPMENT AND FACILITIES

1. New Construction

As mentioned in Section F.2, a new powerline was installed to supply electricity to the Ebby Field pump. Pacific Power and Light put in the poles and line at no expense to the refuge. The refuge supplied orange line markers that the utility company placed on the lines to prevent crane-powerline collisions. Once power was available, and the pump was serviced and tested, Maintenance Workers Storm and Kahlen laid 1,100 feet of new PVC pipeline from the pump to Upper and Lower Duck Ponds.

Both workers showed considerable skill and ingenuity to maintain sufficient slope for water to flow properly on what was very nearly level ground.

Alan Kahlen and Brad Storm installing a delivery pipe from a well and pump which hasn't been used in 17 years. MDC-3165 9/4/92 RLR

| | |
|---|---|
| 5 | Finally, a drop of water to help relieve the drought conditions on the east side of the refuge. MDC-3179 9/11/92 RLR |

The California Department of Forestry's Conservation Crew built nearly 4,000 feet of fence along the refuge's new boundary on the Clark tract (Section E.4).

2. Rehabilitation

Probably the most common and wide-spread rehabilitation work this year involved maintaining water control structures and levees damaged by burrowing beavers and especially muskrats. Muskrat damage is a never ending project, and would seem to insure some kind of job security for the maintenance crew.

As described in Section F-2, 35 nesting islands in Teal Pond were created or rebuilt. This tied in well with an MMS project to rebuild the Teal Pond levee, gravel the tour route over it and rip rap the finished levee.

3. Major Maintenance

The other MMS project for 1992 was the upgrading of the Sharkey Dam. David Sipherd of Auburn California was contracted for this job. The work included removing old, crumbling, weakened concrete, building a wider concrete deck over the dam and finally finishing the new surface with asphalt.



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Sharkey Dam received a major overhaul this year. MDC-3023 5/18/92 RLR

Dorris Canal received a minor change this year when the screwgate at Adair Brown's crossing was moved and replaced with a flash-board riser. This change will greatly increase the efficiency of water diversion and control at the Brown diversion. What used to take several days to fine tune-tune and adjust will be done in a matter of minutes with this simple change.

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Screwgate being replaced by a 48" CMP with a flash board riser on Dorris Canal. MDC-3270
12/92 DNJ

All refuge vehicles and equipment were serviced. In addition, an earth scraper on loan from Salton Sea NWR required extensive maintenance for its old hydraulic system before work could begin on Teal Pond.

With the aid of plans and technical advice from Hydrologist David Langman of the regional Engineering Office, Maintenance Worker Storm installed a new water level recorder at Dorris Dam. Thanks to the drought, he was able to easily build the stilling well and intake pipe on dry ground. At any other time, coffer dams and pumps would have been required to complete this task. The device consists of an A-71 paper recorder which is backed up by an electronic data logger recorder which monitors the level to 1/100 ft. every 15 minutes, 365 days a year. A stilling well was installed at the dam outlet using a 24" CMP. The instruments were installed on top of the dam in a wooden structure to protect them from weather. This should provide good data for many years to come.

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Bradley Storm puts the finishing touches on the stilling well at Dorris Reservoir. MDC-3217
11/4/92 RLR



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The A-71 recorder and electronic data logger are housed in this structure. A solar panel mounted on top provides a permanent charge to the 12 volt battery. MDC-3217
11/10/92 RLR

5. Communication Systems

The refuge contracts with a communications service company to perform an annual check of our radio system. This was not the case in 1992, but probably should have been done . In 1990, after making some minor adjustments and repairs, our radio system was given a clean bill of health. Unfortunately, following this checkup, whenever any radio was keyed in the office, the telephone systems began to independently dial, or if a phone was in use, the call would be disconnected.

It was not until well into 1991 that this annoying mystery was solved. The problem was traced to an old antenna cable in the attic which was used previously for a scanning unit. When this cable was removed, so were all the ghosts haunting the communication systems (or so we thought).

Apparently the ghosts were on vacation, because this same problem resurfaced to a lesser degree in mid 1992. Now there is no rhyme or reason to when the ghosts will strike, and just when it looks like the problem has gone away, A phone call will be cut off or a phone will dial on its own, and the radio will transmit. The annual service in 1993 should present a real challenge to the service company. One can only hope the solution will not eat up too much of the budget.

J. OTHER ITEMS

1. Cooperative Programs

The Phenological Monitoring Programs conducted in cooperation with the National Weather Service entered its 26th year at Modoc NWR. Data collection was conducted by Assistant Refuge Manager Ryno. This program is conducted annually to provide information on blooming and leafing dates of two different species of honeysuckle at various sites throughout the Western United States. The information is gathered and used by the National Weather Service to aid in their long range forecasts.

Assistant Refuge Manager Ryno and his wife Ivy conducted three breeding bird surveys off of the refuge, the Davis Creek Route (#165), the Likely Route (#151) and the Ingalls Route (#073). These surveys are conducted in cooperation with the research center at Patuxent, Maryland.

The refuge staff participated in the North American Nest Record Program and the Colonial Bird Registry, both in cooperation with Cornell University. Refuge staff also made quarterly reports of noteworthy bird observations to American Birds.

Assistant Refuge Manager Ryno conducted Spring and Fall shorebird counts for the Point Reyes Bird Observatory. This is the fourth year that this survey was conducted as part of the program designed to gather data on Pacific Flyway shorebird population trends.

Assistant Refuge Manager Ryno also participated in the mid-winter eagle survey conducted in early January. This survey was conducted in cooperation with many groups nation wide and coordinated by the USFWS in Ventura,CA.

The second annual Modoc Christmas Bird Count was held on December 26. Fifteen birders braved the cold to tally 9160 birds of 73 species. This was a great increase over last years totals, again due to the return of food and water following the 1992 drought.



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The first annual Audubon birdcount was conducted on Dec. 27, l992. This crew (L to R) David Johnson, Ivy Ryno, Amber Ryno (holding Likely), Bill Pyle, Ross Ryno, Ronnie Ryno, Ron Lange, Vanne Mocilac, Blythe Brown. MDC-3287, 12/27/92

4. Credits

Refuge Manager David Johnson wrote sections A, C - E, G - 7, and J.

Assistant Manager Ronnie Ryno wrote sections B, F, H - 8 through 19 and I.

Administrative Support Assistant Kevin DesRoberts wrote sections F - 9, G - 1 through 6 and 10 though 16.

Photographs were taken by refuge staff and are identified by initials.

The report was typed and assembled by Administrative Support Assistants Kevin DesRoberts and Warren Davis. Editing was done by all authors with final editing by Refuge Manager David Johnson.

K. Feedback

The recent emphasis on Modoc water rights brings to light the importance of proper documentation and monitoring of water use. What appeared to be a secure water system for many years is suddenly a source of debate where neighbors and downstream users are trying to grab water which has traditionally been used on the refuge. It was only because of good documentation and a strong commitment by the refuge staff that these changes in water use are possible without major threats to the whole system. A new effort is being developed to install water monitoring devices and a documentation system which will protect us well into the future. Water is invaluable, but if you can't use it how and when you need it, then its less valuable. Hopefully, the state Division of Water Resources will take our wildlife needs into consideration and approve the changes as we have requested.

In addition to funding limitations, Modoc NWR is in dire need of a permanent Biologist position. The Refuge has gone over 30 years (since it was established) without a biologist. Seasonal Biological Technicians and refuge management personnel have collected data and monitored wildlife populations on the refuge. Due to personnel changes and years of insufficient funding to hire a seasonal Bio-Tech, much of the data collected is inconsistent with frequent gaps between consecutive years. This makes accessing the long term effects of Refuge habitat management practices on wildlife populations very difficult, if not impossible. Establishing a permanent biologist position at Modoc NWR would greatly benefit the management of the Refuge and hence the wildlife that utilize it. Presently, due to time limitations of management personnel, many important programs (habitat monitoring...etc.) cannot be properly initiated. Hopefully, in the near future this position will be established.

The compatibility issue on Dorris Reservoir is a prime example of the importance of having good biological information. Politics and public sentiment too quickly dominate the issues when biological data is poor or insufficient.